UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,619	10/18/2006	Yuanxin Qiao	14556.0005USWO	7371

23552 7590 11/03/2008

MERCHANT & GOULD PC
P.O. BOX 2903
MINNEAPOLIS, MN 55402-0903

EXAMINER	
HENRY, CHRISTOPHER P	
ART UNIT	PAPER NUMBER
4172	
MAIL DATE	DELIVERY MODE
11/03/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/566,619	QIAO, YUANXIN	
	Examiner	Art Unit	
	CHRISTOPHER HENRY	4172	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 January 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Pre-Amendment

Please note that this action reflects the changes included in the pre-amendment filed January 30, 2006.

Specification

1. The disclosure is objected to because of the following informalities:

   a. On page 16, line 10, applicant recites "an combinting module" and "an combining module", both should read "a combining module".

   b. On page 16, line 25, applicant recites "may further comprises a", this should read "may further comprise a".

   c. On page 17, line 24, applicant recites "in summer", this should read "in summary".

   Appropriate correction is required.

2. The description of Figure 5 is incomplete, as it does not disclose the meaning of a "Statistic Frequency Number".

Drawings

3. The drawings are objected to because Fig. 1 indicates a "radio transmition", this should be corrected to say "radio transmission". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claim 1 objected to because of the following informalities: the applicant recites in line 2 "comprise the" which does not make grammatical sense. Applicant is recommended to change "comprise the" to "comprising". Appropriate correction is required.

5. Claim 3 objected to because of the following informalities: the applicant recites in line 4 "results" which does not make grammatical sense. Applicant is

recommended to change "results" to "resulting". Appropriate correction is required.

6. Claim 9 objected to because of the following informalities: the applicant recites in line 3 " weighting combining" which does not make grammatical sense. Applicant is recommended to change "weighting" to "weighted". Appropriate correction is required.

7. Claim 13 objected to because of the following informalities:

d. The applicant recites in line 2 "comprise the" which does not make grammatical sense. Applicant is recommended to change "comprise the" to "comprising".

e. The applicant recites in line 7 "combinting". It is assumed the applicant meant "combining".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claim 1-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 (and therefore also claims 2-12) recites the limitation "each station" in line 5. There is insufficient antecedent basis for this limitation in the claim. It is assumed for the purposes of examination that the applicant meant "each base station".

Claim 2 (and therefore also claims 3-5, 7) recites the limitation "predefined number of base stations" in line 5. There is insufficient antecedent basis for this limitation in the claim. It is unclear as to what the predefined number of base stations is and if it refers to a certain number of base stations that may be in range or total number of base stations in a system or if it refers to the number of effective base stations communicating with the subscriber terminal. It is assumed for the purposes of examination that the applicant meant "predefined maximum number of base stations".

Claim 2 (and therefore also claims 3-5, 7) recites the limitation "predefined number of signals" in line 6. There is insufficient antecedent basis for this limitation in the claim. It is unclear what this predefined number of signals is. It is assumed for the purposes of examination that the applicant was referring to the signals determined in step A1 by the predefined (maximum) number of base stations.

Claim 2 (and therefore also claims 3-5, 7) recites the limitation "the given threshold" in line 8. There is insufficient antecedent basis for this limitation in the claim. It is assumed for the purposes of examination that the applicant meant "a given threshold".

Claim 8 recites the limitation "predetermined value added length" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-5, 7, 9, 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frigon (US Patent Application Publication 2003/0108135) in view of Chen et al. (US Patent 7269206).

Regarding claim 1, A method for estimating carrier frequency offset in subscriber terminals, said method steps comprise the:

A. determining number of effective base stations from which more than one signals are received by a subscriber terminal and main path positions of each signal;

B. combining the signals of each station corresponding to said number of effective base stations based on the main path positions obtained in step A;

C. calculating a rough estimation value of the carrier frequency offset based on combined signal in step B.

Regarding A, Frigon discloses a method of determining a correct synchronization code (Paragraph 90-91) using multi-stage code

acquisition (Paragraph 92). Base stations using the same carrier frequency are identified using their synchronization code, as was discussed by the applicant. Frigon does not, however, expressly describe the method of determining number of effective base stations from which more than one signals are received by a subscriber terminal and main path positions of each signal to determine a synchronization code. Chen et al does disclose the method of determining a number of effective base stations from which more than one signals are received by a subscriber terminal and main path positions of each signal as discussed by the applicant. (Column 5 lines 9-20, 30-32, 37-42, 42-44, 50-58) Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to obtain a synchronization code by first determining number of effective base stations from which more than one signal are received by a subscriber terminal and main path positions of each signal as the suggestion lies in Chen et al that this may improve the accuracy of choosing a synchronization code from 93% percent using solely the maximum received value to 98% using the method that is used to determine the number of effective base stations from which more than one signals are received by a subscriber terminal and main path positions of each signal. (Column 5 lines 32-42).

Regarding B, Frigon. discloses combining the signals of each station corresponding to said number of effective base stations

based on the main path positions obtained. (Paragraph 136, Frigon shows how to combine a signal using weighted coherent combining diversity which can be applied to the signals received from the various base stations)

Regarding C, Frigon discloses calculating a rough estimation value of the carrier frequency offset based on combined signal (Paragraph 137, Figures 17-18)

Regarding claim 2, Frigon in view of Chen et al discloses a method as claimed in claim 1, wherein said determining number of effective base stations from which more than one signals are received by a subscriber terminal in step A comprises steps:

A1. calculating peak power value of each signal received by a subscriber terminal, and selecting the peak power values of predefined number of base stations from higher to lower; (Chen Column 5, lines 24-27 where the examiner is reading the correlation results as power values and lines 30-32, 37-44)

A2. determining the number of effective base stations from predefined number of signals are received by the subscriber terminal by comparing the ratio of the highest peak power value from the order in step A1 to the subsequent peak power values with the given threshold. (Chen Column 5, lines 44-55)

Regarding claim 3, Frigon in view of Chen et al. discloses a method as claimed in claim 2, wherein said signals are synchronous downlink pilot signals, and said step A1 further comprises steps:

A11. shift multiple correlating a local synchronous downlink pilot code and a received synchronous downlink pilot signal results in a power value of the synchronous downlink pilot signals received by the subscriber terminal ; (Chen Column 5, lines 22-27, where the standard synchronization process and developing correlation results table in a standard manner is defined in the background of the invention in Column 2, lines 17-31)

A12. determining peak power values corresponding to each of the synchronous downlink pilot codes. (Chen Column 5, lines 22-27, where the standard synchronization process and developing correlation results table in a standard manner is defined in the background of the invention in Column 2, lines 34-35)

Regarding claim 4, a method as claimed in claim 3 wherein said method further comprises steps in between step A11 and step A12:

selecting the power values of each frame of more than one frames and averaging said power values of each frame.

Chen et al. discloses using a matched filter to perform the synchronization but does not expressly disclose selecting the power values of each frame of more than one frames and averaging said power values of each frame. Frigon

discloses selecting the power values of each frame of more than one frames and averaging said power values of each frame (Frigon Paragraph 9, lines 4-10). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to select the power values of each frame of more than one frames and average said power values of each frame. Frigon discloses that in a low signal-to-noise ratio environment the received signal may not be strong enough and that averaging the signals will help achieve a better result. (Frigon Paragraph 9, lines 1-2).

Regarding claim 5, Frigon in view of Chen et al. discloses a method as claimed in claim 2, wherein said step A2 further comprises steps:

A21. numbering the peak power values ordered from the highest to the lowest and setting a current sequence number as predefined number of the base stations; (Chen Column 5, lines 42-44)

A22. determining whether the highest peak power value and a peak power value corresponding to the current sequence number are greater than the given threshold, if so, setting the number of effective base stations from which the signals are received by a subscriber terminal as the value of the current sequence number, otherwise, the current sequence number decreases by one and returns back to step A22. (Chen Column 5, lines 44-55, Figure 9)

Regarding claim 7, Frigon in view of Chen discloses a method as claimed in claim 2, the method further comprises a step before said step B:

multi-path combining signals of each base station. (Paragraph 130, Frigon shows how to combine a signal using weighted coherent combining diversity which can be applied to each individual base station's signal)

Regarding claim 9, Frigon in view of Chen discloses a method as claimed in claim 1, wherein said step B of incorporating the signals of each station corresponding to the number of base stations is: equal gain combining or weighting combining signals of each base station corresponding to said base station number to obtain an combined signal sequence. (Paragraph 136, Frigon shows how to combine a signal using weighted coherent combining diversity which can be applied to the signals received from the various base stations)

Regarding claim 13, Frigon in view of Chen discloses a device for estimating carrier frequency offset, said device comprises at least comprise the:

a decision module for determining base station number from which signals are received by a subscriber terminal and a main path position of signal transmitted from each base station based on the signals received by a subscriber terminal, and then outputting the number of the effective base station and the main path position of each signal to an combining module; (Chen, Column 5 lines 9-20, 30-32, 37-42, 42-44, 50-58)

a combining module for combining the signals from each base station corresponding to the number of effective base stations based on the main path position of signals and then outputting the combined signals to a carrier frequency offset acquiring module; (Frigon Paragraph 136, Frigon shows how to combine a signal using weighted coherent combining diversity which can be applied to the signals received from the various base stations)

a carrier frequency offset acquiring module for obtaining a rough estimating value of the carrier frequency offset based on the combined signals. (Paragraph 137, Figures 17-18)

Regarding claim 14, Frigon in view of Chen discloses a device as claimed in claim 13, wherein said device further comprises a multi-path combining module for multi-path combining the signals of each base station, and then outputting the multi-path combined signal to the combining module, if the effective base station number is greater than 1. (Frigon Paragraph 130, Frigon shows how to combine a signal using weighted coherent combining diversity which can be applied to each individual base station's signal)

12. Claim 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Frigon (US Patent Application Publication 2003/0108135) in view of Chen et al. (US Patent 7269206) as applied to claim 1 above, and further in view of Li et al.

(US Patent 6778588) in view of Demir et al. (US Patent Application Publication 2003/0072357).

Regarding claim 6, Frigon in view of Chen discloses receiving synchronization signals and using a method of correlation to obtain synchronization but does not expressly disclose a method as claimed in claim 1, further comprises, before said step A, reading vector data of 128 chips while receiving synchronous downlink pilot signals at the beginning of a downlink pilot time slot. Li et al discloses using a method of obtaining synchronization by correlating over a time, including a guard period of N symbols followed by the synchronization code symbols followed by another guard period of N symbols. (Column 6, lines 33-34) Demir et al discloses the structure of a transmission in a TD-SCDMA system as having a 32 chip guard period followed by a 64 chip synchronization code followed by a 96 chip guard period of which 32 could be used as according to the method disclosed by Li et al. (Column 1, lines 49-54) Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a method as claimed in claim 1, further comprises, before said step A, reading vector data of 128 chips while receiving synchronous downlink pilot signals at the beginning of a downlink pilot time slot. Demir et al discloses a structure that is used for obtaining synchronization and Li et al discloses a method for obtaining synchronization. Li et al discloses a method for obtaining synchronization by correlating over a certain time window of guard

periods and a 64 chip synchronization period as a method for obtaining correct synchronization timing and Chen et al requires the use of a standard synchronization process that takes the correlations across an input sequence. (Column 5, lines 22-27 where the standard synchronization process and developing correlation results table in a standard manner is defined in the background of the invention in Column 2, lines 17-31). The TD-SCDMA uses a 64 chip synchronization code and correlating across 128 chips (32 chip guard period on either side) allows for finding the correct synchronization in the presence of timing delays.

13. Claim 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Frigon (US Patent Application Publication 2003/0108135) in view of Chen et al. (US Patent 7269206) as applied to claim 2 above, and further in view of Li et al. (US Patent 6778588) in view of Lucidarme et al (US Patent Application Publication 2004/0196793).

Regarding claim 8, Frigon in view of Chen discloses a method as claimed in claim 7, but does not expressly disclose wherein said step of multi-path combining signals of each base station comprises steps:

beginning from a point of previously predetermined number of the peak power value, reading data of synchronous downlink pilot signals at a point which

is 2 times of the predetermined value added length of said synchronous downlink pilot code;

performing Max Ratio Combination after eliminating phase difference between symbols of multi-path synchronous downlink pilot signal with different time delay and the phase difference of delay path.

Li et al discloses beginning from a point of previously predetermined number of the peak power value, reading data of synchronous downlink pilot signals at a point which is 2 times of the predetermined value added length of said synchronous downlink pilot code. Li discusses obtaining P symbols before and after a training sequence midamble. (Column 9, lines 2-7) The midamble is at a known location in a time slot. (Column 8, lines 59-67) Lucidarme discloses performing Max Ratio Combination after eliminating phase difference between symbols of multi-path synchronous downlink pilot signal with different time delay and the phase difference of delay path. (Paragraph 5) Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a method as claimed in claim 7, wherein said step of multi-path combining signals of each base station comprises steps:

beginning from a point of previously predetermined number of the peak power value, reading data of synchronous downlink pilot signals at a point which is 2 times of the predetermined value added length of said synchronous downlink pilot code;

performing Max Ratio Combination after eliminating phase difference between symbols of multi-path synchronous downlink pilot signal with different time delay and the phase difference of delay path.

Using maximum ratio combining allows greater accuracy in estimating the transmitted signal and using P symbols before and after will allow time variations in received signal to be multipath combined.

14. Claims 10-12 rejected under 35 U.S.C. 103(a) as being unpatentable over Frigon (US Patent Application Publication 2003/0108135) in view of Chen et al. (US Patent 7269206) as applied to claim 9 above, and further in view of Ono (US Patent 6996156).

Regarding claim 10, Frigon in view of Chen discloses calculating frequency offset (Frigon Paragraph 137) but does not expressly disclose method as claimed in claim 9, wherein said step C is to obtain a rough estimating value of the carrier frequency offset according to the phase difference between two symbols spaced by a defined distant in said combined signal sequence. Ono discloses a method as claimed in claim 9, wherein said step C is to obtain a rough estimating value of the carrier frequency offset according to the phase difference between two symbols spaced by a defined distant in said combined signal sequence (Column 14, lines 52-64). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a method as

claimed in claim 9, wherein said step C is to obtain a rough estimating value of the carrier frequency offset according to the phase difference between two symbols spaced by a defined distant in said combined signal sequence. Ono discloses a method of frequency offset calculation and Frigon discusses using a method of frequency offset calculation. Ono discloses a more exact method of calculating the frequency offset for better synchronization.

Regarding claim 11, Ono discloses a method as claimed in claim 10, wherein said step C further comprises: estimating carrier frequency offset for a predefined times, and then averaging them to get a carrier frequency offset estimation. (Column 14, lines 52-64)

Regarding claim 12, Ono discloses method as claimed in claim 10, wherein said step C is to sum up the phase differences between two symbols spaced by a defined distant in said incorporated signal sequence, and then computing the phase angle to get the carrier frequency offset estimation. (Column 14, lines 52-64)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER HENRY whose telephone

number is (571)270-7496. The examiner can normally be reached on Monday - Friday 7:30 am - 4:00 pm EST, Off Every Other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis West can be reached on 5712727859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. H./
Examiner, Art Unit 4172

/Lewis G. West/
Supervisory Patent Examiner, Art Unit 2618